



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|--|-------------|----------------------|--------------------------|------------------|
| 09/919,024 | 07/31/2001 | Harunori Hirao | 4296-144 | 3715 |
| 7590 12/29/2005 MATHEWS, COLLINS, SHEPHERD & GOULD, P.A. SUITE 306 100 THANET CIRCLE PRINCETON, NJ 08540 | | | EXAMINER OH, TAYLOR V | |
| | | | ART UNIT 1625 | PAPER NUMBER |

DATE MAILED: 12/29/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/919,024

Applicant(s)

HIRAO ET AL.

Examiner

Taylor Victor Oh

Art Unit

1625

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 07 December 2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,2 and 4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,2 and 4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 31 July 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
- 1) ☒ Certified copies of the priority documents have been received.
 - 2) ☐ Certified copies of the priority documents have been received in Application No. _____.
 - 3) ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

Continued Examination Under 37 CFR 1.114

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 12/07/05 has been entered.

The Status of Claims

Claims 1-2 and 4 are pending.

Claims 1-2 and 4 have been rejected.

DETAILED ACTION

Priority

1. It is noted that applicants have satisfied the requirement of 35 USC 119 by filing priority document ,JP 2000-238419, 8/7/ 2000.

Drawings

2. The drawings filed on July 31, 2001 are accepted by the examiner.

Claim Rejections - 35 USC § 103

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

Claims 1-2 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Frank (U.S. 3,904,652) in view of Kerr (U.S. 3,366,648).

Frank teaches a process for producing maleic anhydride from n-butane using a complex catalyst (see col. 1 ,lines 5-10) and a low oxygen concentration so as to avoid the flammable limit of the system (see col. 4 ,lines 57-60); after butane is oxidized to maleic anhydride , the effluent is cooled and the condensed maleic anhydride is withdrawn from the separator (see col. 2 ,lines 19-44). Furthermore, the flammable limits of the system are dependent on pressure, temperature and concentration of the gases in the reaction zone (see col. 4 ,lines 60-66).

However, the instant invention differs from the prior art in that the raw material isobutylene is not mentioned; the step of absorption is unspecified.

Kerr also teaches a process for producing dicarboxylic acid anhydride, such as maleic anhydride (see col. 7 ,line 43) by catalytic oxidation of aliphatic carbons and unsaturated hydrocarbons of from 4 to 6 carbon atoms, such as butene-1 or isobutylene (see col. 7 ,lines 10-14) in the presence of oxygen and a catalyst (see col. 1 ,lines 28-34); furthermore, in order to avoid explosive hazards, 1.0 to 1.5 mole % of the monoolefin is recommended for optimum yield of the product (see col. 4 ,lines 60-66). In addition, the recovery procedure may be conducted by absorption in suitable media with subsequent separation and purification of the dicarboxylic acid anhydride (see col. 7 ,lines 4-8).

Frank expressly teaches the process for producing maleic anhydride from n-butane using a complex catalyst and a low oxygen concentration so as to avoid the flammable limits of the system ; Kerr also teaches the generic oxidation process for producing maleic anhydride by catalytic oxidation of isobutylene (see col. 7 ,lines 10-14) in the presence of oxygen and a catalyst. Both prior art have been involved with the production of maleic anhydride under similar reaction conditions (the reactants, etc.). Furthermore, Kerr has offered the guidance for the safe concentration of the raw material in order to prevent the explosion as well as the recovery procedure which may be conducted by absorption procedure.

Therefore, it would have been obvious to the skilled artisan in the art to be motivated to incorporate Kerr's safe concentration of the raw material and absorption procedure into the Frank process. This is because the skilled artisan in the art would expect such modifications to be successful and safe for producing the desired maleic anhydride as shown in Kerr's guidance.

Applicants' Argument

3. The applicants argue the following issue:
 - a. Frank does not disclose any steps used during starting up of a reactor causing a raw material and the molecular oxygen-containing gas to pass a

range in which the concentration of said raw material (excluding the concentration of said raw material at 0 vol. %) is less than the concentration of the lower explosion limit of said raw material and the concentration of oxygen is not less than the limiting oxygen concentration.

b. The none of the Kerr and Frank do teach a step for reaching a steady state causing a range in which concentration of the raw material is less than the concentration of the lower explosion limit of the raw material and the concentration of oxygen is less than the limiting oxygen concentration.

c. Kerr only teaches steady state, but does not teach or suggest steps to be used during starting up a reactor.

The applicants' argument have been noted, but these arguments are not persuasive.

First, with regard to the first argument, the Examiner has noted applicants' argument. However, Frank expressly teaches the process for producing maleic anhydride from n-butane with a low oxygen concentration so as to avoid the flammable limit of the system (see col. 4 ,lines 57-60). Furthermore, the claim did not specify what the limiting oxygen concentration can be for the process; therefore, it is plausible to the skilled artisan in the art to assume that the Frank's concentration of oxygen is less than the limiting oxygen concentration. Therefore, the prior art does read on the claimed invention.

Second, with regard to the second and third arguments, the Examiner has noted applicants' argument. However, applicants have indicated that Kerr does teach the steady state of the claimed process; Kerr also has pointed out that, in order to avoid explosive hazards, 1.0 to 1.5 mole % of the monoolefin is recommended for optimum yield of the product (see col. 4, lines 60-66). Similarly, Frank expressly teaches the process for producing maleic anhydride from n-butane using a complex catalyst and a low oxygen concentration so as to avoid the flammable limits of the system. Both prior art have been involved with the safety issue of avoiding the flammable limits of the system during the production of maleic anhydride under similar reaction conditions (the reactants, etc.). In addition, the claim did not specify what the limiting oxygen concentration can be for the process; therefore, it is plausible to the skilled artisan in the art to assume that the Frank's concentration or Kerr's concentration of oxygen is less than the limiting oxygen concentration. Therefore, the prior art does read on the claimed invention.

Therefore, all the rejections are maintained.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Taylor Victor Oh whose telephone number is 571-272-0689. The examiner can normally be reached on 8:30-5:00.

Art Unit: 1625

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cecilia Tsang can be reached on 571-272-0562. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

*** *Wing* V.Sh
12/27/15